ABSTRACT OF THE DISCLOSURE

An inventive method and apparatus is provided by a bidirectional optical 1 x 2 device formed by a cascade of three optical 2 x 2 devices. The first of two distal end ports of a first 2 x 2 device in the first tier of the cascade is optically coupled via a first bidirectional optical path to a proximal end port of a second 2 x 2 device (one of two 2 x 2 devices in the second tier of the cascade). The second distal end port of the first 2 x 2 device is optically coupled via a second bidirectional optical path to a proximal end port of the third 2 x 2 device (the other of the two 2 x 2 devices in the second tier of the cascade). Each 2 x 2 device is bidirectional where optical signals propagate through the 2 x 2 device in the forward and backward directions simultaneously. An input WDM signal is received at a first proximal end port of the first 2 x 2 device. As the input WDM signal forward propagates through the first 2 x 2 device (from proximal end to distal end), it is demultiplexed into first and second subsets of optical channels. Third and fourth subsets of optical channels are received, respectively, at a distal end port of the second 2 x 2 device and a distal end port of the third 2 x 2 device. As the third and fourth subsets of optical channels backward propagate through the first 2 x 2 device (from distal end to proximal end), they are multiplexed into an output WDM signal that is output at the second proximal end port of the first 2 x 2 device. The demultiplexing and multiplexing occur simultaneously to thereby perform bidirectional 1 x 2 optical demultiplexing and 2 x 1 optical multiplexing in the 1 x 2 device. A cascade of (N-1) bidirectional optical 1 x 2 devices having m tiers where $2^m = N$ may be utilized to provide bidirectional 1 x N demultiplexing, N x 1 multiplexing.